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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,812	01/23/2004	C.P. Kelkar	4959	5008

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EXAMINER

SINGH, PREM C

ART UNIT	PAPER NUMBER
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1797

NOTIFICATION DATE	DELIVERY MODE
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11/02/2007

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/763,812	Applicant(s) KELKAR ET AL.	
	Examiner Prem C. Singh	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-23 and 25-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-23 and 25-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/03/2007 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
5. Claims 17-23, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peters et al (US Patent 6,379,536) in view of Aubert et al (US Patent 6,214,306).
6. With respect to claim 17, Peters discloses a process for NO_x control in an FCC process by using a composition that comprises (i) an acidic oxide support, (ii) an alkali/alkaline earth metal, (iii) a transition metal oxide having oxygen storage capability, and (iv) a transition metal selected from Group I B and/or II B. (See column 1, lines 53-62). Peters further discloses a method of reducing NO_x emission during fluid cracking of a hydrocarbon feedstock into lower molecular weight components, said method comprising contacting a hydrocarbon feedstock with a cracking catalyst at elevated temperature whereby lower molecular weight hydrocarbon components are formed, said

cracking catalyst comprising a NO_x reduction component of the invention (See claim 12, column 6, lines 22-40).

Peters invention does not specifically disclose the ratio between the mixed metal (cerium and zirconium) oxides and the remaining components of the NO_x reduction composition. However, the invention does disclose in an embodiment ceria content of 1 wt% based on the silica-alumina support and silver oxide to be 5 wt % of the silica-alumina support (See column 4, lines 34-48).

Peters does not disclose (i) mixed cerium and zirconium oxide in the NO_x reduction composition. However, Peters uses ceria (See column 2, lines 50-52) and further discloses, "Other non-stoichiometric metal oxides having known oxygen storage capability may also be used (Column 2, lines 52-53).

Aubert invention discloses a composition based on zirconium and cerium oxides and its use in NO_x reduction. Aubert further discloses that the composition comprises of (i) zirconium oxide and cerium oxide and it is provided in the form of pure solid solution of cerium oxide in zirconium oxide. (See column 1, lines 30-35). The invention further adds that the composition additionally contains (ii) a doping element chosen alone or a mixture from rare earth metals, alkaline earth metals, particularly lanthanum (See column 2, lines 47-57).

Aubert also discloses that the composition of the invention can be used in the catalysis of various reactions such as hydrodenitrification, cracking, hydrocracking etc. (See column 7, lines 50-60). Aubert discloses that zirconium oxide and cerium oxide

today appear as two particularly important and advantageous constituents in multifunctional catalysts (See column 1, lines 10-17).

Since Peters and Aubert both inventions are disclosing a similar NO_x reduction composition in a catalytic cracking process, and also since zirconium is known for its oxygen storage capability, it would have been obvious to one skilled in the art at the time the invention was made to modify Peters invention and add (i) a mixed zirconium oxide and cerium oxide as suggested by Aubert into the composition of Peters for an enhanced NO_x reduction capability. *See In Re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980). It would also have been obvious to combine Peters and Aubert inventions and specify the ratio of cerium plus zirconium oxide and other components of the NO_x reduction composition given by Peters.

7. With respect to claims 18 and 19, Peters invention discloses, "The invention encompasses FCC processes using the NO_x reduction compositions of the invention either as an integral part of the FCC catalyst particles themselves or as separate admixture particles in the FCC catalyst inventory." (Column 1, lines 63-67).

8. With respect to claim 20, Peters invention discloses, "The said cracking catalyst is fluidized during contacting said hydrocarbon feedstock." (Claim 13, column 6, lines 41-42).

9. With respect to claim 21, Peters invention discloses, "The method of claim 12 further comprising recovering used cracking catalyst from said contacting step and treating said used catalyst under conditions to regenerate said catalyst." (Claim 14, column 6, lines 43-46).

10. With respect to claim 22, Peters invention discloses, "The method of claim 12, wherein said hydrocarbon feedstock contains at least 0.1 wt% nitrogen." (Claim 15, column 6, lines 47-48).

11. With respect to claim 23, Peters invention does not disclose cerium and zirconium oxide contents.

Aubert discloses, " Expressed in the form of oxides, the compositions according to the invention generally exhibit a Zr/Ce atomic ratio equal to or greater than 1." (Column 3, lines 10-15). "According to other embodiment of the invention, the cerium proportion can be at most 20%." (Column 3, lines 26-28). Thus, as discussed under claim 17, it would have been obvious to one skilled in the art at the time the invention was made to modify Peters invention and use a Zr/Ce ratio as claimed, for a better NO_x reduction composition.

12. With respect to claim 25, Peters invention discloses, "Preferably, the transition metal is selected from the group consisting of Cu, Ag and mixtures thereof." (Column 2, lines 66-67).

13. With respect to claims 26 and 27, Peters invention discloses, "The transition metal oxide having oxygen storage capability may be any transition metal oxide having oxygen storage capability similar to that of ceria." (Column 2, lines 47-49).

Since Peters suggests using any transition metal oxide similar to ceria and Aubert discloses using lanthanum as a doping element in the NO_x reduction composition as discussed under claim 17, it would have been obvious to one skilled in the art at the time the invention was made to modify Peters invention and use lanthanum oxide in place of ceria for similar performance in the NO_x reduction. Aubert further discloses, "Mention may more particularly be made of yttrium, lanthanum, neodymium, praseodymium, europium, and samarium." (Column 2, lines 55-57). See *In Re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958).

14. With respect to claims 28 and 29, Peters invention discloses, "The amount of NO_x reduction component in the additive particles is preferably at least 50 wt%." (Column 3, lines 21-23).

Double Patenting

15. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140

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F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

16. Claims 17-23 and 25-29 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No.

6,852,298. Although the conflicting claims are not identical, they are not patentably distinct from each other because the '298 claims have an acidic oxide support and only cerium oxide as one component. The present application does not claim an acidic support and claims a mixed oxide of cerium and zirconium. Since the support material does not play an active role in the NO_x reduction process during FCC operation, and since zirconium and cerium appear to be two particularly important and advantageous constituents in multifunctional catalysts for NO_x reduction, it would have been obvious to one skilled in the art at the time the invention was made to modify the '298 claims to eliminate the acidic oxide support and include zirconium with cerium for an enhanced NO_x reduction.

Response to Arguments

17. Applicant's arguments filed 10/03/2007 have been fully considered but they are not persuasive.

18. The Applicant argues that the zirconium and cerium oxide composition disclosed by the secondary reference would not be found obvious to one of ordinary skill in the art for substitution into the NO_x control FCC catalyst of the primary reference of Peters. While the secondary references suggests that the cerium/zirconium oxide composition can be used in many applications such as cracking or hydrocracking, the patent does not otherwise suggest that this particular composition would have use as an additive to reduce NO_x during cracking. The patent is primarily concerned with the use of the catalyst in three-way automotive catalysts as disclosed in column 1, lines 5-20 and column 8, lines 5-7. The present application admits that mixed oxides of cerium and zirconium have found extensive use in automobile exhaust applications. The present invention however, is directed to an additive for FCC processing and for the addition of a mixed oxide of cerium and zirconium for NO_x control in FCC. One of ordinary skill in the art would not consider the cerium-zirconium composition of the secondary reference as useful in the FCC NO_x control composition of the primary reference in view of the different purposes of the references. The suggestion in the secondary reference that the mixed cerium/zirconium oxide can be used for hydrodenitrification or cracking, does not

suggest applicability with copper or silver oxide for NO_x reduction during cracking. Moreover, the suggestion of using a cerium/zirconium mixed oxide in a three-way automobile catalyst does not suggest use of such catalyst in an FCC environment for NO_x reduction, nor would the results of such use be expected by one of ordinary skill in the FCC art.

The Applicant's argument is not persuasive because Aubert discloses, "Multifunctional catalysts is understood to means catalysts capable of carrying out not only oxidation, in particular of carbon monoxide and hydrocarbons present in exhaust gases, but also reduction, in particularly of nitrogen oxides also present in these gases ("three-way" catalysts). "Zirconium oxide and cerium oxide today appear as two particularly important and advantages constituents in this type of catalyst." (Column 1, lines 10-17). Clearly, mixed zirconium and cerium oxide is a suitable catalyst for NO_x reduction. Aubert also discloses that this catalyst can be used in various processes including hydrodenitrification, cracking, and hydrocracking (See column 7, lines 50-57). Aubert also discloses that these compositions can be applied to any support commonly used in the field of catalysis (see column 7, lines 35-37). Aubert further adds that the composition additionally contains doping elements alone, or in mixture, from rare earth metals, alkaline earth metals, aluminum, thorium, scandium, gallium, titanium, niobium, or tantalum (See column 2, lines 47-51). Aubert does not disclose that this composition will not function in presence of copper or silver. Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify Peters invention by using

the mixed zirconium and cerium oxide catalyst disclosed in Aubert invention to reduce NO_x emission in the in the FCC process of Peters.

19. The Applicant argues that While Peters discloses a copper or silver oxide, the patent does not otherwise suggest a mixed oxide of cerium and zirconium. The cerium oxide used in Peters is for oxygen storage. The present examples in the application clearly illustrate that a mixed oxide of cerium and zirconium greatly improves surface area retention and NO uptake retention after steaming, a typical condition of an FCC process, relative to comparative examples of 100% cerium oxide and zirconium oxide. Such results are not suggested in the secondary reference. Again, the secondary reference does not teach NO_x reduction in FCC with a mixed cerium/zirconium oxide. Accordingly, it is believed that the method as set forth in claims 17-23 and 25-29 patentably distinguishes over the art of record.

The Applicant's argument is not persuasive because the Applicant is conducting steaming to improve surface area retention and NO uptake retention of mixed cerium and zirconium oxide. Aubert is conducting washing, drying, maturing, and calcining of mixed cerium and zirconium oxide to produce the final catalyst composition (See column 5, lines 43-67; column 6, lines 1-36). Thus, Aubert process should also be producing mixed cerium and zirconium oxide with improved surface area retention and NO uptake retention. Aubert discloses use of mixed cerium and zirconium oxide in cracking (See column 7, lines 52-63), which includes FCC.

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20. With respect to obviousness type double patenting rejection, the Applicant argues that U.S. 6,852,298 while directed to NO_x reduction in an FCC process claims a specific range of ceria to an oxide of a lanthanide series element other than ceria. This range is not at all claimed in the claims of the present application. Further, applicants have clearly shown in the present examples that a mixture of cerium oxide and zirconium oxide yields improved results with respect to the stability of a catalyst relative to cerium oxide alone. Accordingly, not only are the claims of the present application and the claims of the '298 patent directed to different claimed inventions, but the addition of zirconium oxide with the cerium oxide in the presently claimed invention yield results not at all expected from the prior art with respect to FCC catalysis. Accordingly, it is believed that the obviousness-type double patenting rejection is improper.

As discussed in the Office action above under obviousness double patenting, the Applicant's argument is not persuasive since zirconium and cerium appear to be two particularly important and advantageous constituents in multifunctional catalysts for NO_x reduction (See Aubert: column 1, lines 15-20). Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the '298 claims to include zirconium with cerium for an enhanced NO_x reduction. It is to be noted that the claim of patent '298 requires a ratio of cerium oxide to the oxide of lanthanide of at least 1.66:1. The Applicant's claim requires a ratio of [cerium + zirconium oxide] to the total of [(cerium + zirconium oxide) + (oxide of lanthanide) + (transition metal oxide)] of at least 0.7:1.0. Combined teachings of Peters and Aubert disclose a NO_x reduction

composition similar to the Applicant's claim. One skilled in the art can easily modify the ratio claimed in '298 patent to the Applicant's claimed ratio.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 8:00 AM-4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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